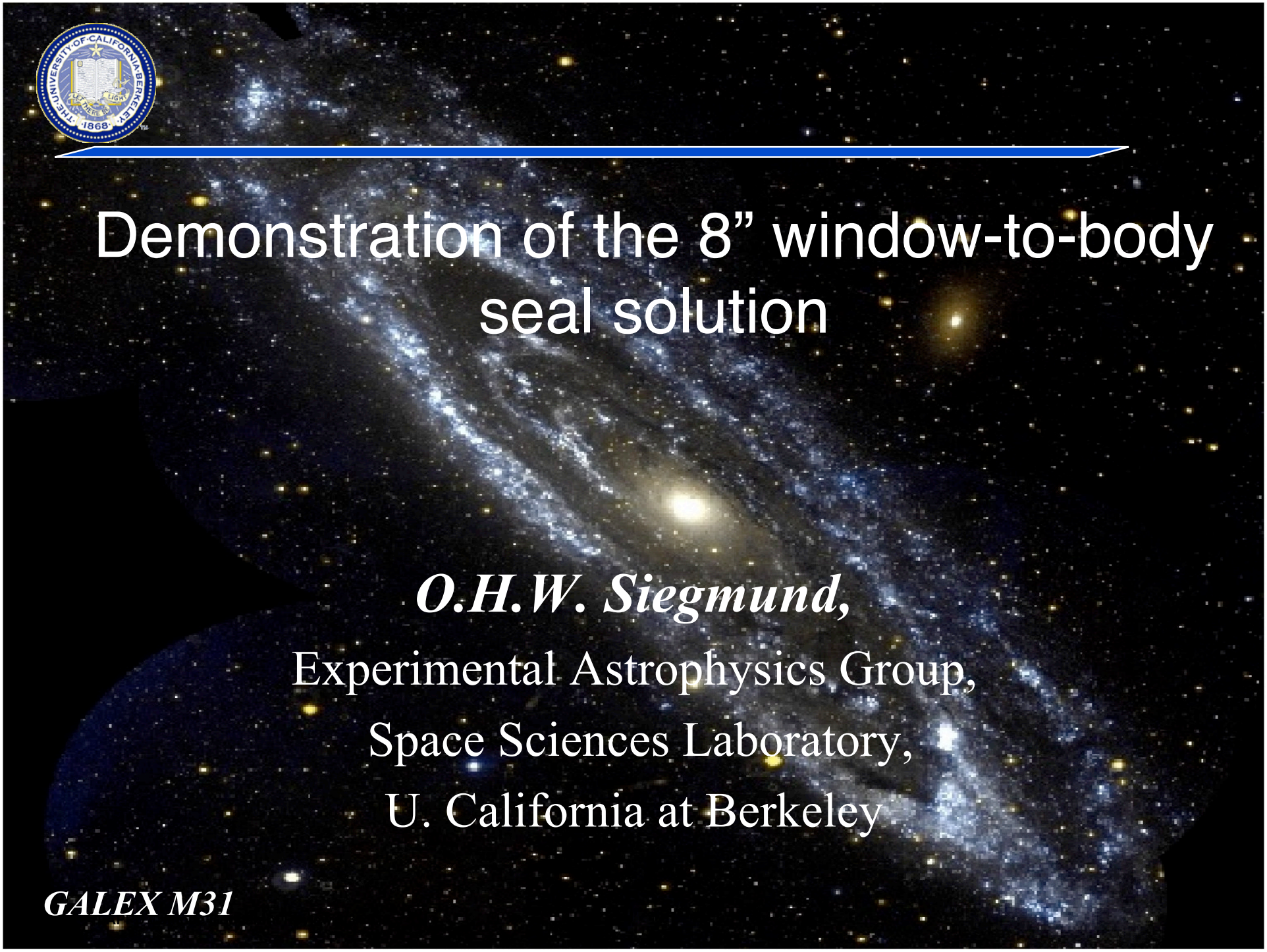


Demonstration of the 8” window-to-body seal solution

O.H.W. Siegmund,

Experimental Astrophysics Group,

Space Sciences Laboratory,

U. California at Berkeley

GALEX M31

LAPPD 8” Window to Body Seal

- UCB uses Alumina body construction with hot indium seal onto borosilicate window.
- Variety of window material options, Schott B33, B270, D263, need to be metalized to get good Indium adhesion
- Alumina frame is paired with a Kovar/Ni/Cu plated Indium well that are H_2 brazed together to form the detector body
- Initial trials can be done with a “sheet” of Alumina rather than an alumina “window frame” so that the missing “anode” does not cause fragility/warping stresses.

Schott B270/D263 General Parameters

The cathode substrate, window or window coating, changes the photocathode performance. Quartz, fiber optics, 7056 glass are common. Borosilicate is not, so we need to test this.

B 270 Superwite is a clear high transmission crown glass (modified soda-lime glass) (85% transmission at 340nm for 2.0mm) Coefficient of Thermal Expansion (Static Measurement, 20-400° C.) 9.6 x 10^{-6} °K

D 263 is a borosilicate glass (85% transmission at 380nm for 2.0mm)
Coefficient of Thermal Expansion (Static Measurement, 20-300° C.) 7.2 x 10^{-6} °K

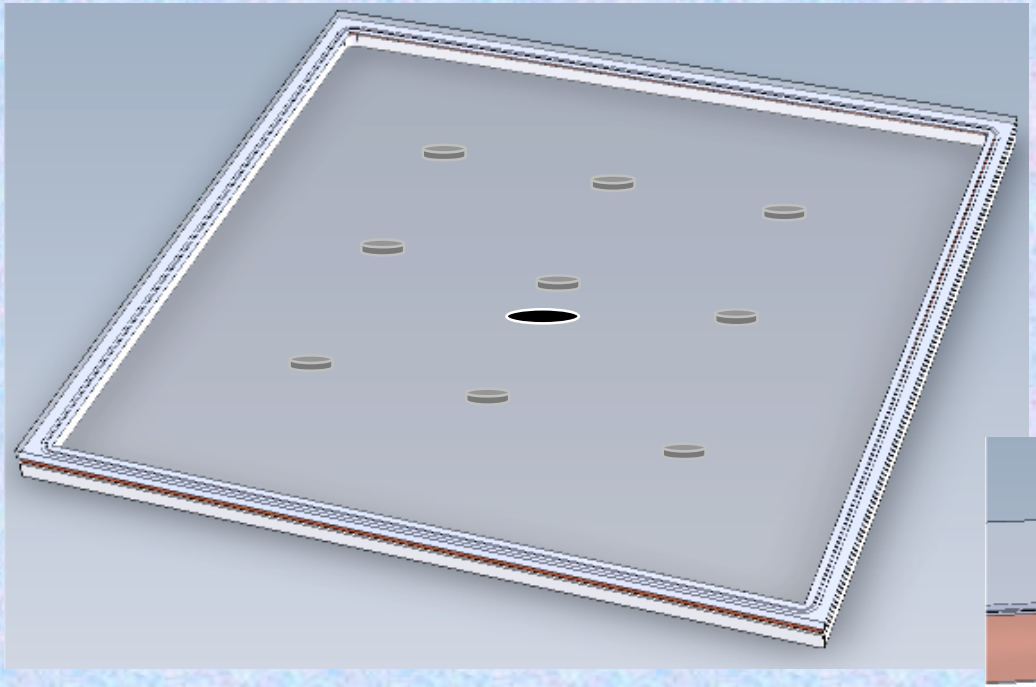
Refractive index

@400nm

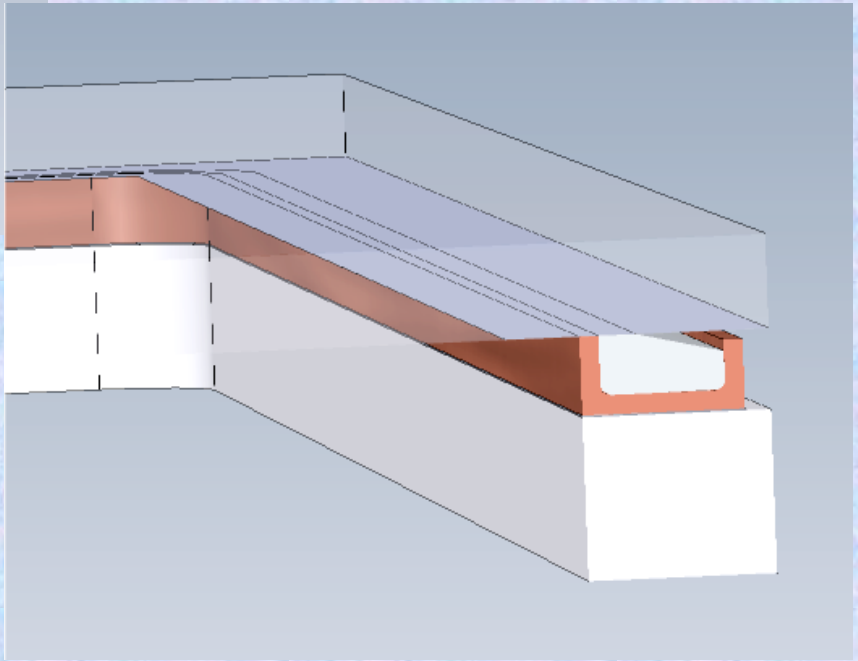
D263	**1.52**
B270	**1.53**
Air	**~1.0**
Water	**~1.32**

B33 borofloat is contaminated with Tin on both sides, although otherwise appropriate, may need an inconvenient polish operation before use.

Brazed Body Development



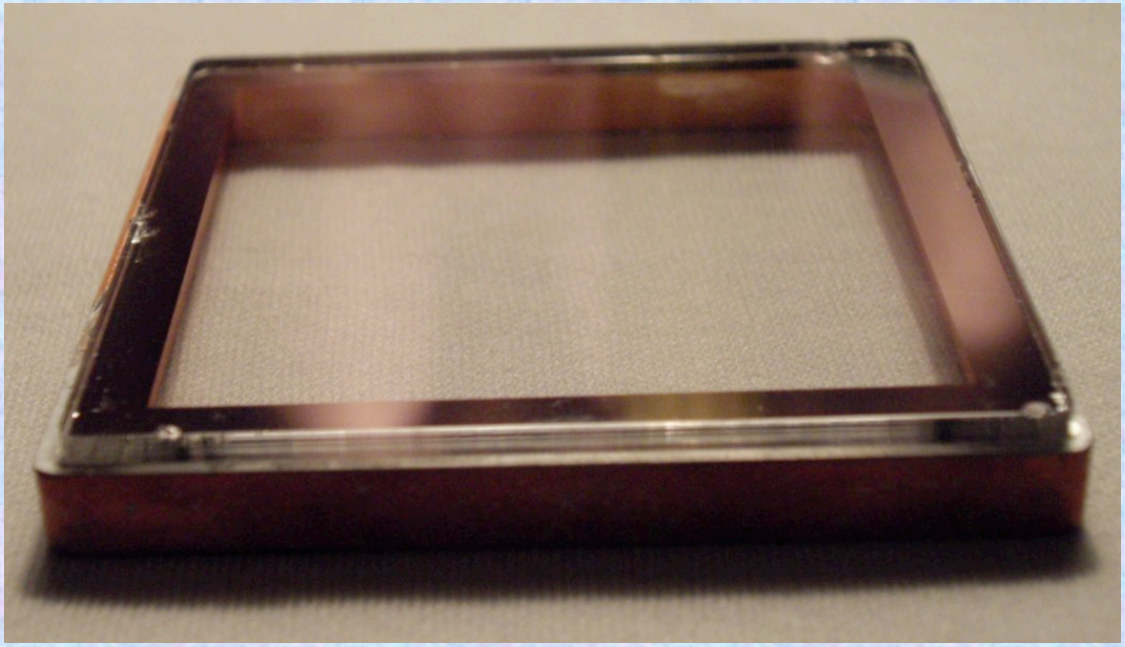
Indium well is filled with a eutectic Indium alloy & vacuum baked/cleaned to remove oxides.



8.7" "Window frame" construction. Body design has machined alumina frame (cut from sheet) which is H_2 brazed to a Kovar indium well (Ni and Cu plated) and to the anode. Window seal tests can use a sheet of alumina instead of the frame, with spacers to accommodate vacuum leak tests.

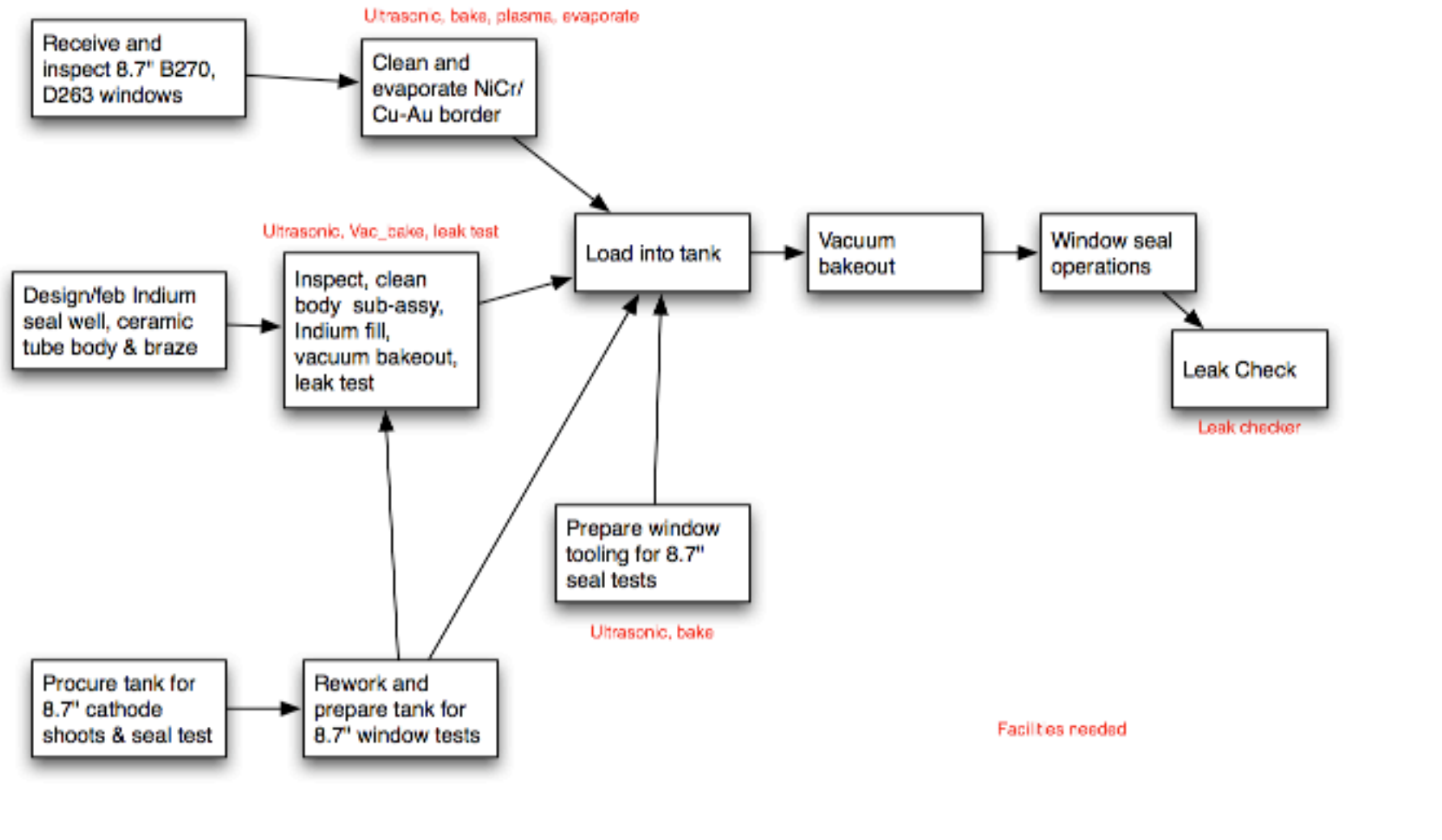
Window Seal Development

Will metalize 8.7”window and produce an Indium seal on a test article to test leak tightness of the seal.

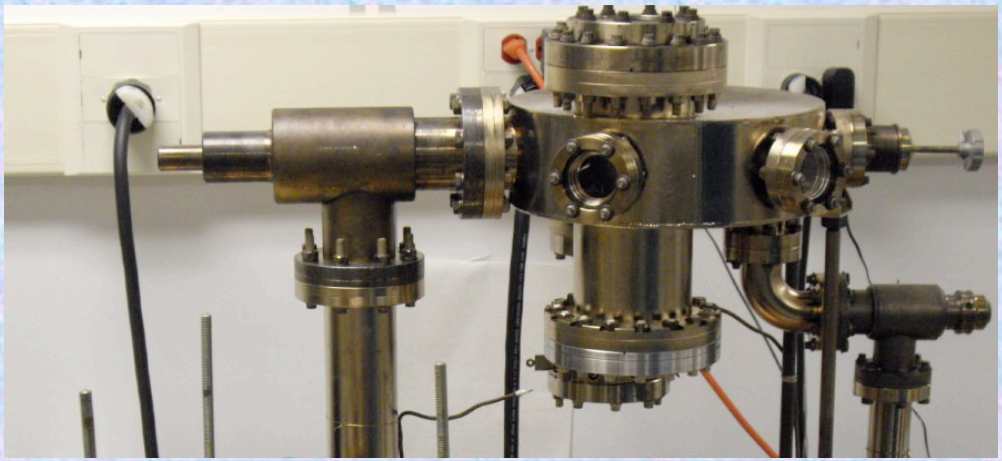


3” window test article on metal frame with Indium seal

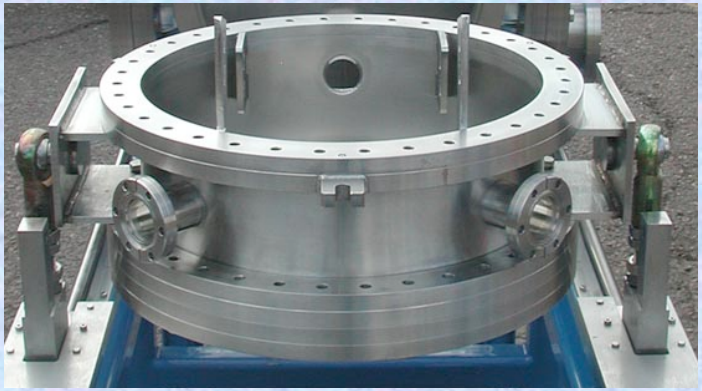
Window Seal Development Process



Window and Cathode Process Test Tank System



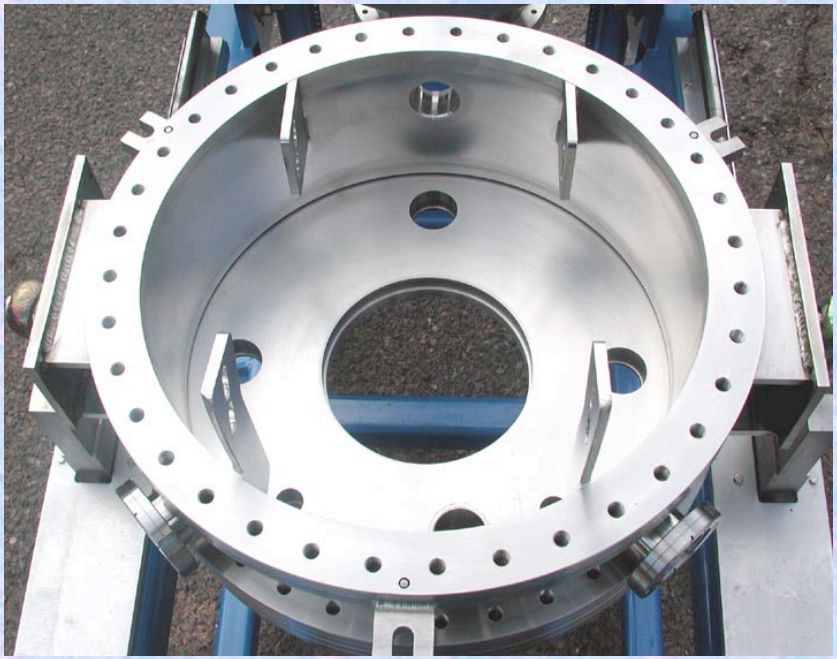
Same size scale



Small tank is used to process alkali cathodes (33mm) and tubes of small area.
Can take 4-6 samples/run
- **Small sample test runs**
- **Substrate material tests**

Larger flange tank, 16.5”
Can take big windows to test
- **-Seal tests**
- **-Window manipulation**
- **-Some room to move inside!**

8” Tube Seal and Cathode Process Tank System

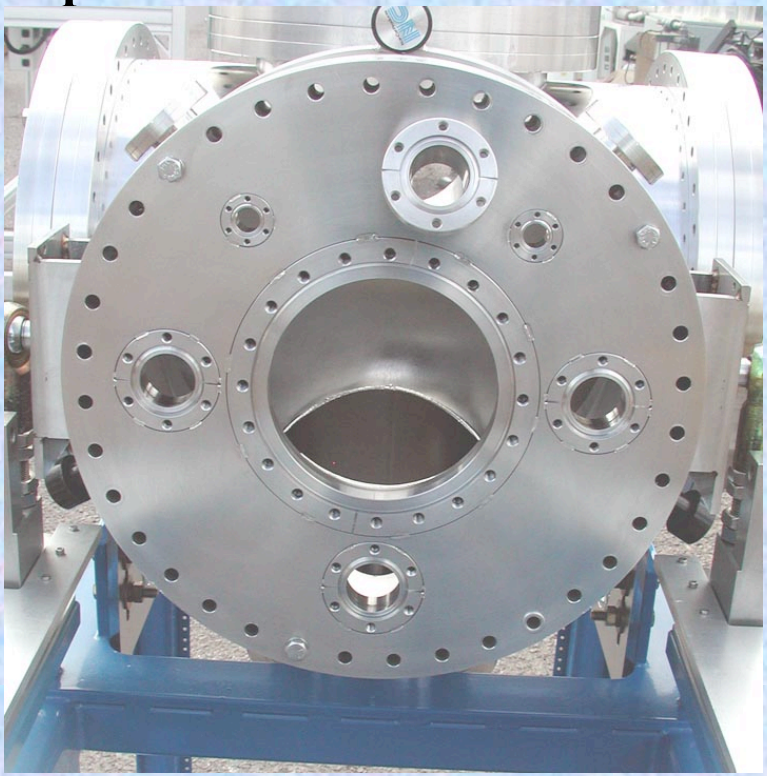


UHV 16.5” process tank for cathode and seal development with B270/D263 8.66” windows:-

- large area cathodes

- uniformity tests

- QE optimization



Tube Lab, oven and test/process stations.

Process Oven

Plasma cleaner

Leak Checker

Evaporator

8” Tube Seal Test Status

Large window seal development, 8.66” square

- Facilities, have everything except larger UHV tank
  - Need to commission plasma cleaner
  - UHV tank coming, need to prep & install on current stand
- Windows, have B270, need to get D263
  - Need tooling for metalization scheme
  - Need tooling for window manipulation
- 8.66” detector “bodies”
  - Have design for In well, quote coming
  - Have quote for alumina sheets/frames
  - Getting quote for materials prep and brazing